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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP
100 GALLERIA PARKWAY, NW
STE 1750
ATLANTA, GA 30339-5948

EXAMINER	
PHAM, TUAN	

ART UNIT	PAPER NUMBER
2643	9

DATE MAILED: 06/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/939,439	LEVONAS ET AL.	
	Examiner	Art Unit	
	TUAN A PHAM	2643	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3, 5-10 and 17-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3, 5-10, and 17-20* is/are rejected.

7)☐ Claim(s) ___ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 5 is objected to because of the following informalities: claim 5 depends on claim 2, but claim 2 was canceled. Examiner assumed that claim 5 should be dependent on claim 1. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 3, and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (U.S. Patent No. 6,256,383) in view of Haakansson et al. (U.S. Patent No. 5,933,797, hereinafter, "Haakansson").

Regarding claim 1, Chen teaches a transceiver (i.e. automatic balance system) (see figure 1, automatic balance system 10, col.5, ln.6-10), comprising:

means for receiving a locally generated transmit signal (see figure 1, telephone receive the locally signal from 2 to 4 wire hybrid);

means for coupling the locally generated transmit signal to a communication medium (see figure 1, telephone couple to hybrid by telephone line), the means for coupling further coupled to a remotely generated receive signal (see figure 1, remote side including FIR and IIR filter); and

configured to reduce both short-term echo components and long-tail echo components of the locally generated transmit signal wherein the reduction of transmit signal echo is realized in a hybrid echo canceller (see figure 1, automatic balance system 10, col.3, ln.10-42, col.5, ln.6-10).

It should be noticed that Chen fails to clearly teach a multi-stage digital filter comprising a dual-stage finite impulse response filter. However, Haakansson teaches such features (see col.4, ln.45-55) for a purpose of canceling the echo signals in communication system.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of multi-stage digital filter

comprising a dual-stage finite impulse response filter, as taught by Haakansson, into view of Chen in order to improve the echo canceller in communication system.

Regarding claim 3, Chen further teaches the transceiver further comprising: means for determining the length in taps of the digital filter required to reduce the short-term echo components, and means for bifurcating the multi-stage digital filter responsive to the determination means (see col.6, ln.14-38).

Regarding claim 5, Chen further teaches the transceiver wherein the multi-stage digital filter comprises a first stage that applies coefficients derived for each tap of the first stage and a second stage that derives coefficient values for a subset of the taps of the second stage (see col.7, ln.4-51).

Regarding claim 6, Chen further teaches the transceiver wherein the second stage applies a coefficient value to each tap (see col.8, ln.25-67).

Regarding claim 7, Chen further teaches the transceiver wherein the second stage derives coefficient values for each K th tap (see col.6, ln.15-30, K=number of taps).

Regarding claims 8, 9, and 10, Chen further teaches the transceiver wherein the second stage uses an interpolation scheme to determine coefficients to apply at each of the taps disposed between taps associated with a derived coefficient (see col.2, ln.28-35, col.7, ln.5-50, estimate coefficients between each taps).

4. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (U.S. Patent No. 6,256,383) in view of Betts et al. (U.S. Patent No. 5,659,581, hereinafter, "Betts").

Regarding claim 17, Chen teaches a digital signal transceiver (i.e. automatic balance system), comprising:

a transmitter configured to receive a locally generated transmit signal (see figure 1, transmit signal (y));

a hybrid electrically coupled to the transmitter configured to receive and inductively couple the transmit signal to a two-wire transmission line, the hybrid further configured to receive a remotely generated receive signal along the two-wire transmission line (see figure 1, 2 to 4 wire hybrid 24);

a receiver configured to process the remotely generated receive signal (see figure 1, receive signal (x)); and

An echo canceller disposed in parallel between the transmitter and the receiver configured to reduce both short-term echo components and long-tail echo components of the locally generated transmit signal (see figure 1, FIR filter, col.3, ln.10-32, col.7, ln.5-50).

It should be noticed that Chen fails to clearly teach the echo canceller calculates coefficient values for less than N taps while emulating an N tap digital filter. However, Betts teaches such features (see col.4, ln.4-25) for a purpose of calculating the coefficient of the filters.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the use of echo canceller calculates coefficient values for less than N taps while emulating a N tap digital filter, as taught by Betts, into view of Chen in order to improve the echo canceller in communication system.

Regarding claim 18, Haakansson further teaches the transceiver wherein the echo canceller comprises a bifurcated digital filter that adaptively calculates and applies tap coefficients to each of a plurality of filter taps in a first stage and adaptively calculates and applies a subset of tap coefficient values to a plurality of filter taps in a second stage (see figure 4, col.5, ln.44-67).

Regarding claim 19, Chen further teaches the transceiver wherein the digital filter adaptively calculates a tap coefficient value for a first tap of the second stage and every k th tap thereafter (see col.7, ln.3-50).

Regarding claim 20, Chen further teaches the transceiver wherein the digital filter interpolates the calculated tap coefficient values for the second stage to identify coefficient values to apply at taps disposed between taps associated with a calculated tap coefficient (see col.2, ln.28-35, col.7, ln.3-50).

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. In order to expedite the prosecution of this application, the applicants are also requested to consider the following references. Although Makinen et al. (U.S. Patent No. 6,163,609), Lai et al. (U.S. Patent No. 6,721,287), Kratschmann et al. (U.S. Patent No. 6,690,791), and Romesburg (U.S. Patent No. 6,185,300) are not applied into this Office Action; they are also called to Applicants attention. They may be used in future Office Action(s). These references are also concerned for supporting the system and method for echo canceling and far echo canceller for PCM modems.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Tuan A. Pham** whose telephone number is (703) 305-4987. The examiner can normally be reached on Monday through Friday, 8:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Curtis Kuntz can be reached on (703) 305-4708 and

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have question on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Art Unit 2643
June 4, 2004
Examiner

Tuan Pham

CURTIS KUNTZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600